Plane equations and normal vectors

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Give a normal to $3x - 2y + z = 7$. [2 marks]

Read the coefficients of x, y and z.

Answer: $(3, -2, 1)$

2. Find the plane through (2,0,-1) with normal (1,2,3). [2 marks]

The constant is $2 + 0 - 3 = -1$.

Use the normal coefficients.

Answer: $x + 2y + 3z = -1$

3. Find the plane through O spanned by (1,0,1) and (0,1,1). [2 marks]

A normal is $(-1, -1, 1)$.

Use zero constant and multiply by -1.

Answer: $x + y - z = 0$

4. Are $2x - 4y + 6z = 8$ and $x - 2y + 3z = 4$ equivalent planes? [2 marks]

Divide every coefficient and the constant of the first by 2.

Answer: Yes.

5. Do O, (1,2,3), (2,4,6) determine a unique plane? [2 marks]

The points are collinear.

Infinitely many planes contain their common line.

Answer: No.

6. Parametrise the plane through (1,0,2) with directions (1,1,0), (0,1,1). [2 marks]

Use both independent direction parameters.

The two directions are not parallel.

Answer: $\mathbf{r} = (1, 0, 2) + s(1, 1, 0) + t(0, 1, 1)$.